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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,438	12/28/2005	Kaoru Inoue	043888-0428	3628
20277 7590 12/14/2007 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, N.W. WASHINGTON, DC 20005-3096			EXAMINER LEWIS, BEN	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 12/14/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/562,438

Applicant(s)

INOUE ET AL.

Examiner

Ben Lewis

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10/1/07, 11/20/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 11-15 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 11-15 and 18-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/6/07, 11/20/07</u> . | 6) <input type="checkbox"/> Other: _____  |

### **Detailed Action**

1. The Applicant's amendment filed on October 1<sup>st</sup>, 2007 was received. Claims 1 and 12-15 were amended. Claims 2-10, 16 and 17 were cancelled. Claims 19-20 were added.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (issued on May 31<sup>st</sup>, 2007).

The claim rejections under 35 U.S.C. 112, first paragraph, on claims 15 and 18 are withdrawn, because the claim 15 has been amended

### ***Claim Rejections - 35 USC § 112***

3. Claim 19 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant has not disclosed how to make or use the invention. It would be undue experimentation for one of ordinary skill in the art to make the invention. There is no teaching of how the Applicant is capable excluding the effect of the porosity of the adjacent electrode and porous insulating film when measuring the void size distribution

of the adhering interface of the electrode and porous insulating film by a mercury intrusion porosimeter.

Furthermore, it is not clear how one of ordinary skill in the art would be able to practice the instant invention since it lacks steps or working examples needed to exclude the effect of the porosity of the adjacent electrode and porous insulating film when measuring the void size distribution of the adhering interface of the electrode and porous insulating film by a mercury intrusion porosimeter.

Factors to be considered in determining whether the claimed invention would require undue experimentation are given in MPEP 2164.01 (a). In re Wands, 858 F. 2d 731; 8 USPQ 2d 1400, 1404 (Fed. Cir. 1988). Only the relevant factors will be addressed for determining undue experimentation of the presently claimed invention. The relevant factors are (A) Breadth of the claims; (B) The amount of direction provided by the inventor, (C) The existence of working examples, and (D) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

**Factor (A) Breadth of the claims:**

No guidance is given in the specification of how to exclude the effect of the porosity of the adjacent electrode and porous insulating film when measuring the void

size distribution of the adhering interface of the electrode and porous insulating film by a mercury intrusion porosimeter.

It would be undue experimentation to one of ordinary skill in the art to determine how to exclude the effect of the porosity of the adjacent electrode and porous insulating film when measuring the void size distribution of the adhering interface of the electrode and porous insulating film by a mercury intrusion porosimeter.

**Factor (B) The amount of direction provided by the inventor.**

Applicant only provides examples using different porous insulating film porosities in Applicant's Example 1.

**Factor (C) The existence of working examples:**

This factor has been addressed by factor (B) above.

**Factor (D) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.**

This factor has been addressed by factor (A) above.

4. Claim 19 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Page 26 of Applicant's specification states: From the viewpoint of ensuring the mass productivity of the battery, desirably, the void formed on the adhering interface between the porous insulating film and the electrode surface to which the porous

insulating film is adhered has a size of 1 to 4  $\mu\text{m}$  when measuring the size using a mercury intrusion porosimeter.

Since there is no teaching of a void size distribution of said negative electrode and said porous insulating film measured by a mercury intrusion porosimeter has a peak in a region ranging from 1 to 4  $\mu\text{m}$  then there appears to be no support for the newly added claim 19.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear as to what is meant by dendrite and coral shape. The examiner understands that corals to and dendrites have numerous different shapes.

***Claim Rejections - 35 USC § 103***

6. Claim 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (Japanese Pub. No. 09-147916) in view of Shinohara et al. (U.S. Pub. No. 2002/0055036 A1).

With respect to claim 1, Inoue et al. disclose a nonaqueous electrolyte secondary battery (title) wherein,

With respect to the porous insulating layer Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060).

With respect to the separator Inoue et al. teach that fine porosity polypropylene film separator is applied to the coated negative electrode sheet (Paragraph 0060).

With respect to the porosity of the separator Inoue et al. teach that the separator has a porosity of 20% to 90% (Paragraph 0045).

With respect to the relationship between R and P, Inoue et al. teach an R of 0.5 when porosity of the separator is 0.5.

Inoue et al. does not disclose a porosity of not less than 0.35 and not greater than 0.6 for the heat insulating film. However, Shinohara et al. disclose a separator for non-aqueous electrolyte secondary battery (title) wherein, the separator for non-aqueous electrolyte secondary battery of the present invention is characterized by containing a shut-down layer and a heat-resistant porous layer, wherein said separator has a spacer having a form of particles, fibers, net or porous film. In the separator of the present invention, the heat-resistant porous layer suitably consists of a heat-



resistant resin, and is suitably adjacent to the shut-down layer (Paragraph 0011). The pore rate of the heat-resistant porous layer is suitably 30 to 80 volume %, and more suitably 40 to 70 volume %. When the pore rate is less than 30 volume %, the retention amount of an electrolyte may decrease. When the pore rate is more than 80 volume %, the strength of the heat-resistant porous layer may become insufficient (Paragraph 0021).

Therefore, it would have been within the skill of the ordinary artisan to incorporate adjust the porosity of the heat-resistant film (porous insulating film) of Inoue et al. to be within applicant's claimed porosity range in order to enhance electrolyte retention and maintain film integrity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art. In re Boesch*, CCPA 1980, 617 F.2d 272, 205 USPQ215.

Furthermore, when  $R = 0.5$  and  $P$  is between 0.35 and not greater than 0.6, the claimed relationship  $-0.10 \leq R - P \leq 0.30$  is satisfied.

With respect to claim 11, Inoue et al. teach that the porous insulating layer Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (Japanese Pub. No. 09-147916) in view of Yukita et al. (U.S. Patent No. 5,705,292) and further in view of Shinohara et al. (U.S. Pub. No. 2002/0055036 A1).

With respect to claim 12, Inoue et al. disclose a nonaqueous electrolyte secondary battery (title) wherein,

With respect to the porous insulating layer Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060).

With respect to the separator Inoue et al. teach that fine porosity polypropylene film separator is applied to the coated negative electrode sheet (Paragraph 0060).

With respect to the porosity of the separator Inoue et al. teach that the separator has a porosity of 20% to 90% (Paragraph 0045).

Inoue et al. do not specifically teach the porosity of the electrode coating. However, Yukita et al. disclose a lithium ion secondary battery (title) wherein in the first embodiment, as shown in FIG. 1A, a sprayed film, i.e., a heat-resistant and heat-insulating film 20 "porous insulating film" is formed by spraying, e.g, plasma-spraying a ceramic powder of alumina ( $\text{Al}_2\text{O}_3$ ) having a mean particle size of 20  $\mu\text{m}$  on both surfaces of the positive-electrode mixtures 4 deposited on the positive electrode 2 (Col 4 lines 9-15). Yukita et al. also teach that accordingly, the sprayed film has a structure similar to that of the porous sintered body (having a porosity ranging from about 0 to 20%) having micropores formed by combining the sprayed particles. As a result, it is

possible to obtain a film having an ion permeability and resistance to heat higher than 1000 °C (Col 4 lines 45-55). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the porosity of Yukita et al. in the making of the electrode coating "porous insulating film" of Inoue et al. because Yukita et al. teach that having a porosity of 0 to 20% is necessary to obtain ion permeability.

With respect to polycrystalline particles, the inorganic filler particles of Yukita et al. are not perfectly smooth which reads on any particle that is comprised of primary particles.

Inoue et al. as modified by Yukita et al. do not specifically teach that the pore size distribution of the porous insulating film is not less than 0.15 $\mu$ m. However, Shinohara et al. disclose a separator for non-aqueous electrolyte secondary battery (title) wherein, either of the heat-resistant porous layer, the shut-down layer and the spacer may contain an inorganic compound. The inorganic compound contained in a spacer may be just a high order metal oxide having an electrochemical-oxidation resistance, and inactive to an electrolyte. As a concrete example, although aluminum oxide, calcium carbonate, silica, etc. are exemplified, the present invention is not limited to these (Paragraph 0040). Shinohara et al. teach that the pore size or pore diameter of the above-mentioned heat-resistant porous layer "porous insulating film", is suitably 3  $\mu$ m or less, and more suitably 1  $\mu$ m or less. If the average pore size or pore diameter exceeds 3  $\mu$ m, a problem of short circuit may easily occur when the carbon powder or the bit which is the main component of a cathode or an anode drops out (Paragraph

0020). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the pore size of Shinohara et al. into the porous insulating film of Inoue et al. as modified by Yukita et al because Shinohara et al. teach that having a porosity less than  $3\text{ }\mu\text{m}$  "which is within the range claimed by Applicant" prevents short circuiting.

With respect to the inorganic filler particles being polycrystalline, Inoue et al. as modified by Yukita et al. and Shinohara et al. do specifically mention that the inorganic oxide filler particles are polycrystalline. The instant specification teach that from the viewpoint of providing a porous insulating film having high thermal resistance, it is desirable that the inorganic oxide filler have a thermal resistance of not less than  $250^{\circ}\text{C}$ , and that the inorganic oxide filler be electrochemically stable in the potential window of non-aqueous electrolyte secondary batteries. Although many inorganic oxide fillers satisfy these conditions, among inorganic oxides, preferred are alumina, silica, zirconia, titania. Particularly preferred are alumina and titania. The inorganic oxide fillers may be used singly or in any combination of two or more (Paragraph 0038).

Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060). Therefore, it is the position of the examiner that the insulating film particles of Inoue et al. are inherently polycrystalline, given that Inoue et al. as modified by Yukita et al. and Shinohara et al. and the present application utilize same inorganic filler particle material. A reference which is silent

about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claim 12, this claim is a product by process claims. The reaction diffusion bonding of primary particles, do not further limit the product of claim 1. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 698,227 USPQ 964,966 (Fed Cir. 1985).

8. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (Japanese Pub. No. 09-147916) in view of Yukita et al. (U.S. Patent No. 5,705,292) and Shinohara et al. (U.S. Pub. No. 2002/0055036 A1) and further in view of Akashi (Japanese Pub. No. 2004-010701).

With respect to claims 13-14, Inoue et al. as modified by Yukita et al. and Shinohara et al. disclose a battery separator in paragraph 5 above. Inoue et al. as modified by Yukita et al. and Shinohara et al. do not specifically teach wherein the average primary particle size is not greater than 10 $\mu$ m. However, Akashi discloses a polyolefin membrane (title) wherein the membrane contains inorganic oxide particles of

oxidization silicon, alumina and titanium oxide (Paragraph 0013). Akashi teaches that the particle the diameter of the inorganic oxide filler is 100nm (0.1 $\mu$ m) or less (Paragraph 0013). Akashi teach that if the particle size exceeds 100nm, the reinforcement of the polyolefine film to which the particle was added would become less (Paragraph 0012). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the particle size of inorganic filler of Akashi into the separator of Inoue et al. as modified by Yukita et al. and Shinohara et al. because Akashi teach that if the particle size exceeds 100nm, the reinforcement of the polyolefine film to which the particle was added would become less (Paragraph 0012).

With respect to claims 13-14, Applicant also states in paragraph 48 of the instant application that it may be the case that the primary particles cannot be clearly defined in the polycrystalline particles. The instant specification teach that the primary particles forming the polycrystalline particles desirably have an average particle size of not greater than 3  $\mu$ m, more preferably not greater than 1  $\mu$ m. When the primary particles have an average particle size of exceeding 3  $\mu$ m, the amount of the film binder will be excess as the surface area of the filler is decreased, and the swelling of the porous insulating film due to the non-aqueous electrolyte might easily occur. In the case where the primary particles cannot be identified clearly in the polycrystalline particles, the particle size of the primary particles is defined by the thickest part of a knot of the individual polycrystalline particles (Paragraph 0048).

Thus if the limitations regarding diffusion-bonded is regarded as a product-by process limitation, then the inorganic oxide of the prior art having a particle size not greater than 10 microns meets claim 12-14 since the inorganic oxide filler in the prior art inherently is not perfectly round and smooth and may have bumps.

9. Claims 15 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (Japanese Pub. No. 09-147916) in view of Ota et al. (U.S. Patent No. 6,365,300 B1)

With respect to claim 15, Inoue et al. disclose a nonaqueous electrolyte secondary battery (title) wherein,

With respect to the porous insulating layer Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060).

With respect to the separator Inoue et al. teach that fine porosity polypropylene film separator is applied to the coated negative electrode sheet (Paragraph 0060).

With respect to the porosity of the separator Inoue et al. teach that the separator has a porosity of 20% to 90% (Paragraph 0045).

Inoue et al. do not specifically teach the roughness of the surface of the electrode. However, Ota et al. discloses a lithium secondary battery (title) wherein, the surface roughness (Rmax) of the negative electrode, also, affects the battery performance considerably. It is desirable that the value of Rmax be not less than

0.01 $\mu$ m and not more than 5 $\mu$ m. If less than 0.01 $\mu$ m good bonding with the electrolytic layer cannot be obtained, resulting in easy separation (Col 10 lines 1-15). Therefore it would have been obvious to use the roughness values of Ota et al. in manufacturing the electrodes of Inoue et al. because Ota et al. teach that an electrode roughness of 0.01 $\mu$ m and not more than 5 $\mu$ m results in good bonding of the electrolyte layer (Col 10 lines 1-15).

With respect to the void size distribution of said adhering interface having a peak in a region ranging from 1 $\mu$ m to 4 $\mu$ m. The instant specification recites that in order to form a void having a size of 1 to 4  $\mu$ m on the adhering interface, desirably, the surface roughness of the electrode surface to which the porous insulating film is adhered is appropriately adjusted. Specifically, the average value Ra of the surface roughness of the electrode surface measured by a surface roughness measuring instrument is desirably 0.1 to 1  $\mu$ m more desirably 0.2 to 0.8  $\mu$ m. When the Ra is less than 0.1  $\mu$ m, the electrode surface serving as the base for the porous insulating film will be excessively smooth, and it might be difficult to form a void having a size of 1  $\mu$ m or greater on the adhering interface. Conversely, when the Ra exceeds 1  $\mu$ m, the electrode surface serving as the base will be excessively nonuniform and the adhering area between the electrode surface and the porous insulating film will be excessively small, and it might be difficult to form a void having a size of 4  $\mu$ m or less on the adhering interface (Paragraph 0063).



Inoue et al. as modified by Ota et al. teach that the surface roughness ( $R_{max}$ ) of the negative electrode, also, affects the battery performance considerably. It is desirable that the value of  $R_{max}$  be not less than  $0.01\mu m$  and not more than  $5\mu m$ . If less than  $0.01\mu m$  good bonding with the electrolytic layer cannot be obtained, resulting in easy separation (Col 10 lines 1-15).

Inoue et al. as modified by Ota et al. do not disclose any void size distribution data of the adhering interface. However, it is the position of the examiner that such properties are inherent, given that Inoue et al. as modified by Ota et al. and the present application utilize same insulative film on an electrode surface with the same roughness. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claim 18, Inoue et al. teach that the porous insulating layer Inoue et al. teach that the surface of the negative electrode is coated with a coating consisting of 3% carboxy methyl cellulose "film binder" and 97% alpha-aluminum "inorganic oxide filler" (Paragraph 0060).

With respect to claims 19 and 20, Inoue et al. disclose a nonaqueous electrolyte secondary battery in paragraph 8 above.

Inoue et al. do not specifically teach the roughness of the surface of the electrode. However, Ota et al. discloses a lithium secondary battery (title) wherein, the

surface roughness ( $R_{max}$ ) of the negative electrode, also, affects the battery performance considerably. It is desirable that the value of  $R_{max}$  be not less than  $0.01\mu m$  and not more than  $5\mu m$ . If less than  $0.01\mu m$  good bonding with the electrolytic layer cannot be obtained, resulting in easy separation (Col 10 lines 1-15). Therefore it would have been obvious to use the roughness values of Ota et al. in manufacturing the electrodes of Inoue et al. because Ota et al. teach that an electrode roughness of  $0.01\mu m$  and not more than  $5\mu m$  results in good bonding of the electrolyte layer (Col 10 lines 1-15).

With respect to the void size distribution of said adhering interface having a peak in a region ranging from  $1\mu m$  to  $4\mu m$ . The instant specification recites that in order to form a void having a size of 1 to  $4\mu m$  on the adhering interface, desirably, the surface roughness of the electrode surface to which the porous insulating film is adhered is appropriately adjusted. Specifically, the average value  $R_a$  of the surface roughness of the electrode surface measured by a surface roughness measuring instrument is desirably 0.1 to  $1\mu m$  more desirably 0.2 to  $0.8\mu m$ . When the  $R_a$  is less than  $0.1\mu m$ , the electrode surface serving as the base for the porous insulating film will be excessively smooth, and it might be difficult to form a void having a size of  $1\mu m$  or greater on the adhering interface. Conversely, when the  $R_a$  exceeds  $1\mu m$ , the electrode surface serving as the base will be excessively nonuniform and the adhering area between the electrode surface and the porous insulating film will be excessively

small, and it might be difficult to form a void having a size of 4  $\mu\text{m}$  or less on the adhering interface (Paragraph 0063).

Inoue et al. as modified by Ota et al. teach that the surface roughness ( $R_{\text{max}}$ ) of the negative electrode, also, affects the battery performance considerably. It is desirable that the value of  $R_{\text{max}}$  be not less than 0.01 $\mu\text{m}$  and not more than 5 $\mu\text{m}$ . If less than 0.01 $\mu\text{m}$  good bonding with the electrolytic layer cannot be obtained, resulting in easy separation (Col 10 lines 1-15).

Inoue et al. as modified by Ota et al. do not disclose any void size distribution data of the adhering interface. However, it is the position of the examiner that such properties are inherent, given that Inoue et al. as modified by Ota et al. and the present application utilize same insulative film on an electrode surface with the same roughness. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

### ***Response to Arguments***

10. Applicant's arguments filed on October 1<sup>st</sup>, 2007 have been fully considered but they are not persuasive.

*Applicant's principal arguments are*

(a) Measuring a total distribution of the negative electrode and porous insulating film does not require excluding the effects of the porosities of the adjacent components. In

view of the teaching of the specification and consideration of the *In re Wands* factors, it is clear to one of ordinary skill in this art that the present claims fully comport with the requirements of 35 U.S.C. § 112.

(b) The combination of Inoue et al. and Yukita et al. do not suggest the claimed non-aqueous electrolyte secondary battery. Inoue et al. and Yukita et al. do not suggest the porosity P of the porous insulating film is not less than 0.35 and not greater than 0.65, as required by claim 1. As acknowledged by the Examiner, Yukita et al. teach a porosity ranging from about 0 to 20%.

(c) The present claims require that the porous insulating film comprise an inorganic oxide filler and a film binder. The plasma spraying process of Yukita et al. takes place at 10,000 to 20,000 °C (col. 4, lines 37-42). At these temperatures the organic-based carboxy methyl cellulose binder of Inoue et al. would be destroyed. The Yukita et al. process can not be adapted for use with an organic-based binder. Further, the properties of the plasma-sprayed Yukita et al. porous insulating film would clearly be different from the properties of the Inoue et al. porous insulating film comprising a carboxy methyl cellulose film binder. One of ordinary skill would not have had any reasonable expectation that the porous film comprising an inorganic oxide and organic-based film binder Inoue et al. would have the same properties as a film consisting of an inorganic oxide applied by plasma spraying at 10,000 to 20,000 °C.

(d) The combination of Inoue et al., Yukita et al., and Shinohara et al. do not suggest the claimed non-aqueous electrolyte secondary battery. Inoue et al., Yukita et al., and Shinohara et al. do not suggest the polycrystalline particles having the shape of dendrites, coral, or grape bunch, wherein the amount of the film binder contained in the porous insulating film is not greater than 4 parts by weight per 100 parts by weight of the inorganic oxide filler, and wherein 90% cumulative volume pore size D90 in a pore size distribution of the porous insulating film measured by a mercury intrusion porosimeter is not less than 0.15  $\mu\text{m}$ , as required by claim 12.

In response to Applicant's arguments, please consider the following comments.

(a) Furthermore, it is not clear how one of ordinary skill in the art would be able to practice the instant invention since it lacks steps or working examples needed to exclude the effect of the porosity of the adjacent electrode and porous insulating film when measuring the void size distribution of the adhering interface of the electrode and porous insulating film by a mercury intrusion porosimeter.

(b) With respect to said porous insulating film having a porosity of not less than 0.35 and not greater than 0.65, Inoue et al. as modified by Yukita et al. disclose a lithium battery separator above. Inoue et al. as modified by Yukita et al. do not specifically teach a porosity of not less than 0.35 and not greater than 0.65. However, Shinohara et al. disclose a separator for non-aqueous electrolyte secondary battery (title) wherein, the separator for non-aqueous electrolyte secondary battery of the present invention is characterized by containing a shut-down layer and a heat-resistant porous layer, wherein said separator has a spacer having a form of particles, fibers, net or porous film. In the separator of the present invention, the heat-resistant porous layer suitably consists of a heat-resistant resin, and is suitably adjacent to the shut-down layer (Paragraph 0011). The pore rate of the heat-resistant porous layer is suitably 30 to 80 volume %, and more suitably 40 to 70 volume %. When the pore rate is less than 30 volume %, the retention amount of an electrolyte may decrease. When the pore rate is more than 80 volume %, the strength of the heat-resistant porous layer may become insufficient (Paragraph 0021).

Therefore, it would have been within the skill of the ordinary artisan to incorporate adjust the porosity of the heat-resistant film (porous insulating film) of Inoue et al. as modified by Yukita et al. to be within applicant's claimed porosity range in order to enhance electrolyte retention and maintain film integrity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art. In re Boesch*, CCPA 1980, 617 F.2d 272, 205 USPQ215.

(c) Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. Furthermore, Yukita was relied upon for the porosity of the heat insulating film, not the process of making the insulating film. The heating insulating film of Inoue clearly has binder.

(d) It is not clear as to what is meant by dendrite and coral shape. The examiner understands that corals and dendrites can exist as numerous different shapes.

With respect to the pore size distribution, Shinohara et al. teach that the pore size or pore diameter of the above-mentioned heat-resistant porous layer "porous insulating film", is suitably 3  $\mu\text{m}$  or less, and more suitably 1  $\mu\text{m}$  or less. If the average pore size or pore diameter exceeds 3  $\mu\text{m}$ , a problem of short circuit may easily occur when the carbon powder or the bit which is the main component of a cathode or an anode drops out (Paragraph 0020). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the pore size of Shinohara et al. into the porous insulating film of Inoue et al. as modified by Yukita et al because Shinohara et al. teach that having a porosity less than 3  $\mu\text{m}$  "which is within the range claimed by Applicant" prevents short circuiting. (Examiner notes that 3 $\mu\text{m}$  is greater than 0.15 $\mu\text{m}$  which reads on Applicants limitation of not less than 0.15 $\mu\text{m}$ )

***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.




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Ben Lewis

Patent Examiner  
Art Unit 1795

  
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